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(84) Designated Contracting States: AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE Designated Extension States: AL LT LV MK RO SI	(72) Inventors: • Bao, Jay Bridgewater, New Jersey 08807 (US) • Zeng, Shiyu Red Bank, New Jersey 07711 (US)
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(54)

Programmable digital signal processor for demodulating digital television signals

(57)

A phase-lock loop circuit in a demodulator includes a timing recovery block and a carrier recovery block. The demodulator for demodulates a digital signal including symbols. The phase-lock loop includes an integrator processing a block of N samples to produce an average of the N symbols, and means for supplying the average of the N symbols to the timing recovery block and the carrier recovery block every NT period, where T is a sample time interval.

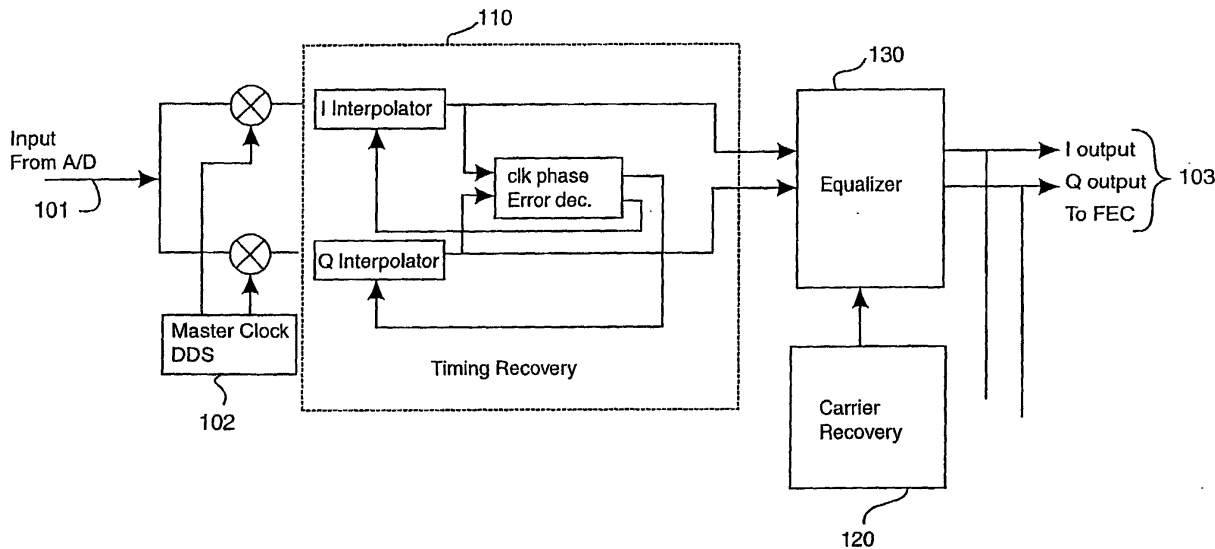


FIG. 1



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EUROPEAN SEARCH REPORT

Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Y	SHETH S ET AL: "Timing and carrier recovery techniques in DSP based digital receivers" MILITARY COMMUNICATIONS CONFERENCE, 1994. MILCOM '94. CONFERENCE RECORD, 1994 IEEE FORT MONMOUTH, NJ, USA 2-5 OCT. 1994, NEW YORK, NY, USA, IEEE, US, 2 October 1994 (1994-10-02), pages 639-643, XP010149740 ISBN: 0-7803-1828-5 * abstract * * Introduction * * Carrier Recovery * * Timing Recovery * * figures 2,3 *	1-10	H04N5/455
Y	US 5 373 255 A (BRAY JEFFREY P ET AL) 13 December 1994 (1994-12-13) * abstract * * column 1, line 6 - column 2, line 46 * * column 3, line 23 - line 47 * * column 8, line 60 - line 67 * * figure 2 *	1-10	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
D,A	BAO J ET AL: "NEW TIMING RECOVERY METHOD FOR DTV RECEIVERS" IEEE TRANSACTIONS ON CONSUMER ELECTRONICS, IEEE INC. NEW YORK, US, vol. 44, no. 4, November 1998 (1998-11), pages 1243-1248, XP000871421 ISSN: 0098-3063 * the whole document * * figure 1 *	1-10	H04N H04L
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 4 December 2003	Examiner Schreib, F
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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Application Number
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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	ERUP L ET AL: "INTERPOLATION IN DIGITAL MODEMS-PART II: IMPLEMENTATION AND PERFORMANCE" IEEE TRANSACTIONS ON COMMUNICATIONS, IEEE INC. NEW YORK, US, vol. 41, no. 6, 1 June 1993 (1993-06-01), pages 998-1008, XP002059992 ISSN: 0090-6778 * section V. Closed-Loop Simulation * * figure 13 * ---	1-10	
A	KARAM G ET AL: "Design and performance of a variable-rate QAM modem for digital cable television" INTERNATIONAL BROADCASTING CONVENTION, LONDON, GB, 14 September 1995 (1995-09-14), pages 178-183, XP002229713 * page 179 - page 180 * * figure 2 * -----	1-10	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
Place of search		Date of completion of the search	Examiner
MUNICH		4 December 2003	Schreib, F
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 11 4882

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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04-12-2003

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